[0043] Thus, it is possible to get out of the risk such as a failure due to the memory-full, and it is possible to ensure the stability of data management using the in-memory database.

[0044] FIG. 2 is a block diagram of a data management apparatus 100 using the in-memory database according to another embodiment of the present invention. Hereinafter, for convenience of explanation, the data managing apparatus 100 using the in-memory database will be referred to as an apparatus 100.

[0045] The apparatus 100 may be configured to include a memory 110 and a control unit 140. Also, according to some embodiments of the present invention, the apparatus 100 may also include a backup database 150. The apparatus 100 may be provided with the memory 110 in the form of a cluster made up of a plurality of physical nodes.

[0046] The memory 110 and the backup database 150 store various kinds of data, command and/or information. Further, the memory 110 and the backup database 150 may store at least one program for managing the in-memory database according to an embodiment of the present invention.

[0047] The memory 110 may be configured to include a random access memory (RAM). Further, the memory 110 may also be configured to include a nonvolatile memory such as a read only memory (ROM), an erasable programmable ROM (EPROM), an electrically erasable programmable ROM (EEPROM) and a flash memory. In particular, according to an embodiment of the present invention, the memory 110 may store the database 120. That is, the memory 110 may be configured to be installed with the in-memory database. The database 120 may include a data table and an index 130. Meanwhile, in this specification, the memory 110 may also be referred to as a main memory.

[0048] The backup database 150 may non-temporarily store the data transmitted from the memory 110. The backup database may be configured to include a hard disk, a removable disk and the like. The backup database 150 may store the contents of the memory, using checkpoint files and log files in order to overcome the drawbacks of the volatile memory 110. In particular, the backup database 150 may also store duplicated data deleted from the memory 110. The backup database 150 may be configured to include a computer-readable recording medium of any form that is well known in the art to which the present invention pertains.

[0049] The control unit 140 controls the overall operation of each component of the apparatus 100. Further, the control unit 140 may also perform control so that information between the respective components of the apparatus 100 is transmitted and received. In particular, the control unit 140 may perform calculation of the value of replication factor of data using the in-memory database according to an embodiment of the present invention. The control unit 140 may perform the control so that the duplicate data is deleted based on the calculation result of the value of replication factor. The control unit 140 may be configured to include a central processing unit (CPU), a micro processor unit (MPU), a micro controller unit (MCU) or a processor of any form well known in the technical field of the present invention. Further, the control unit 140 may also store at least one application or program for executing a method according to an embodiment of the present invention. The function and operation of the control unit 140 will be described in detail in the description of the embodiments of the present invention which will be described later.

[0050] Meanwhile, the apparatus 100 may also be achieved on the above-mentioned computing device. Therefore, although it is not illustrated, according to some embodiments of the present invention, it should be noted that the apparatus 100 may be configured to include an input unit for receiving input of various settings and commands from the administrator of the in-memory database, and an output unit for informing the administrator of the in-memory database about various kinds of information.

[0051] FIG. 3 is a flow chart of a method for managing data using the in-memory database according to another embodiment of the present invention. Hereinafter, the repeated contents of those described in the description of the system referred in FIG. 1 will be omitted.

[0052] In this specification, the data may be stored in a plurality of nodes by being distributed into several pieces by the control unit 140. The duplicated data is data having the same value as the data and may also be distributed and stored in the plurality of nodes. At this time, the control unit 140 may perform control so that the pieces of date duplicated with the data are stored in each node, and each piece of the data duplicated with the data stored is not redundantly stored.

[0053] Meanwhile, one of the data duplicated with the data may be an original data. If the data is the original data, the duplicated data may be a copy. Alternatively, one of the duplicated data is the original data, the remaining duplicated data and the date may be a copy.

[0054] Referring to FIG. 3, the apparatus 100 may receive inputs of the setting of threshold value of the memory 110 in which data is stored (S10). In this case, the apparatus 100 may be configured to include an input unit for receiving inputs of the setting of the threshold value from the administrator of the in-memory database. However, when threshold value is stored in the apparatus 100 in advance, the step (S10) of receiving the threshold value may be omitted.

[0055] Here, the threshold value means a utilization rate of the in-memory database that uses the storage space of the memory 100. The control unit 140 may determine whether the utilization rate of the memory 110 of the in-memory database 120 is equal to or greater than the threshold value (S20).

[0056] As a result of the determination, when the utilization rate of the memory 110 is equal to or greater than the threshold value, the control unit 140 may determine whether the value of replication factor is greater than zero. Here, since the value of replication factor is a natural number, the control unit 140 may determine whether the value of replication factor is a natural number of 1 or more (S30).

[0057] When the value of replication factor is a natural number of 1 or more, the control unit 140 may perform control so that the value of replication factor of data stored in the memory 110 can decrease. When the utilization rate of the memory 110 becomes the threshold value or more, and before the value of replication factor decreases, the value of replication factor has a value of 1 or more. The reason is that the database 120 stores one or more copies with respect to the data, for a stable storage of data. Therefore, in this case, the apparatus 100 may also perform the step S40, without performing the step S30.

[0058] That is, in step S20, as a result of the determination, when the utilization rate of the memory 110 is equal to or